ENVIRONMENTAL ASSESSMENT

CARGILL FERTILIZER BLENDING OPERATION

KRASNOGORIVKA VILLAGE

MARINKA RAYON, DONETSK OBLAST

UKRAINE

Under the auspices of

Citizens Network for Foreign Affairs, Kiev, Ukraine

and the

United States Agency for International Development

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(1) SUMMARY

The Cargill fertilizer blending facility in Marinka, Donetsk will provide quality blends of fertilizer specifically suited to local crops and soil conditions. Cargill also will provide custom application services and soil analysis testing. These activities will not have significant negative environmental impacts. The activities are expected to result in significant beneficial environmental and agricultural effects by helping farmers in the region to improve crop production. This improvement will occur within a context of a severe under utilization of fertilizers in Ukraine. Nationally there is not a shortage, but economic conditions are not providing capital and loans for fertilizer purchases. Thus, vast portions of Ukraine agriculture are not using sufficient fertilizers, especially nitrogen, with resultant yield reduction.

The fertilizer blending facility in Marinka is well constructed and is being rehabilitated by Cargill. The environmental parameters of air and water pollution will be minimal or non existent. The transportation network in the region is under utilized. The warehouse is located in a rural area, where noise from the operation will not interfere with daily living. Sufficient energy is available to assure smooth operation of the plant. Cargill has a worker safety plan for its employees. Some mitigations are required as listed below for the blending operation.

1.1 Mitigations:

1. It is recommended that the planned replacement of the leaky asbestos roof suggested by Cargill be done in a way that protects the roofing workers and Cargill employees from asbestos air pollution. Roofing workers need to wear appropriate filter-masks. Cargill must advise the contracting company in writing that work be done safely with the old asbestos corrugated roofing, and safely dispose of the old materials in accordance with Ukrainian statutes. The warehouse floor needs to be sufficiently cleaned after roof replacement. The roof will not be re-roofed with asbestos.

2. The water run off collection pond is lined with cement, but an adjacent and parallel collecting pond is not. Therefore, the non-lined ditch needs to be blocked off at the tarmac end and the waters need to be diverted into the collection pond. Periodically, the sediments should be either removed to a safe landfill, or covered with impermeable material to prevent escape of the accumulated fertilizer residues, or applied as fertilizer if suitable.

3. The office building, the soil testing laboratory and employees dining/shower rooms need to be satisfactorily connected to the municipal sewerage system, or into a satisfactory septic system. Correct hook up to the municipal system is most desirable. As a continuing part of this Environmental Analysis, CNFA will interact with Cargill in the planning and construction stages of these buildings.

4. Training of personnel about cleaning up spills exterior to the warehouse and proper disposal of spillage is required. This can be accomplished in house by Cargill as a normal part of their existing worker safety program.

5. The wall separators between the different kinds of fertilizers as planned by Cargill are good mitigations for protecting the quality of the product.

6. Caution from radioactive contamination from fertilizer from Belarus and certain parts of the Ukraine and Russia needs to be carefully considered to avoid contamination by radioactive elements. CNFA has a Geiger counter, and basic monitoring can be accomplished upon request.

7. During Technical Assistance to the Farmers and Dealerships, Cargill must provide information concerning the proper use of fertilizers, with emphasis on the correct storage and disposal of containers.

8. In the soil testing laboratory, all strong bases and acids must be clearly identified with labels in Russian. The chemicals must be stored safely in a container or closet clearly marked with warning signs. Used reagents from soil testing must be neutralized before discarding. If the used reagents are to be poured into the municipal drains, sufficient dilution must occur. If they are to be discarded at the local municipal waste disposal land fill, they must be neutralized before transfer. If the reagents are to be disposed of on the site, the discard tank should be properly lined and identified as a disposal area. The best alternative would probably to dilute the reagents sufficiently before disposal into the local sewer system.

9. Cargill?s plan is to paint the warehouse. If it is to be painted, sufficient precautions for storing paint and thinners must be taken. A separate storage area needs to be cordoned off, with warning signs posted. Correct disposal of excess paint is required.

(2) PURPOSE

The purpose of this project is to create a bulk fertilizer blending plant that can mix nitrogen, phosphorus and potassium to the specific nutrient needs of farmers? fields. Cargill will offer fertilizers in bulk and bagged form, along with custom spreading. To facilitate correct fertilizer blends, a soil laboratory will be equipped and operated by the project, along with the use of portable on-farm soil testing kits. Cargill, working through the Rayonagrochim?s marketing network, their venture partner, will involve an agronomic-based approach utilizing soil testing, technical advice to farm managers, new fertilizer applicators, application support and service and prescription blending. The objective is to lower costs and maximize yield potential to the farms. The project will target large and small private farms in the Donetsk Oblast. Clients may be established in adjoining states (Oblasts) through synergies with Cargill Seeds technology divisions, barter with Cargill?s grain division and Cargill Fertilizer farm service representatives.

(3) DESCRIPTION OF THE PROJECT

Cargill, Inc. is establishing a new fertilizer marketing unit in Ukraine and has imported a U.S. manufactured fertilizer bulk blender and supporting equipment to produce and distribute bulk or bagged fertilizer blends to Ukrainian farmers. The blending facility is being established in the Donetsk Oblast under a warehouse leasing and fertilizer marketing agreement with the private fertilizer distributor Marinka Rayonagrochim. Raw materials will be locally found and purchased and balanced with imports as needed. The new feature in distribution of fertilizers by the venture

is that it will involve an agronomically-based approach utilizing soil testing, technical advice to farm managers, new fertilizer applicators, application support and service and prescription blending. The objective is to lower cost and maximize yield potential to the farms.

The warehouse belongs to Cargill?s partner Marinka Rayonagrochim located near the village of Krasnogorivka, Donetsk. The warehouse is already in compliance with the licenses and regulations of Ukraine needed to distribute fertilizer. The Kasnogorivka warehouse was built in 1984 and is structurally sound and ready for operation. A rail line extends through the warehouse and permits dumping on either side of the line onto cement floors. The property has a drainage pool designed to catch run off from the grounds in case of heavy rains. The drainage pool has a cement-lined bed. In the warehouse, the cement floor was poured below the level of the doors, which will prevent spillage and movement of fertilizer contaminants out of the warehouse, except on the tires of the trucks and other vehicles. An impermeable cement patio surrounds the warehouse. The patio is of sufficient size to assure that fertilizer will not tend to move off the property. Periodic rains will wash the fertilizer from the cement patio toward the holding pond. Drainage on the property goes toward the pond. A test drill hole was perforated at the immediate location of the collection pond for water depth. At a depth of 35 meters, water had not yet been reached.

The capacity of the blender will be up to 700 tons per day in two shifts or 15,000 tons per month from this site. The market area will be the Donetsk Oblast, where various Rayonagrochims have their distribution network in place and where Cargill has their seed plant. Rayonagrochims have representation in each of the 18 districts and warehouses in 15 districts. Cargill Seeds has already worked with 30 small private farms in the Oblast and expects to find additional small farms during the project for their products.

A bagging line has been imported that can use small bags. This will be of special interest to vegetable farmers and gardeners. Cargill will produce various blended fertilizers that target specific vegetable crops. Bag sizes will vary from 5 - 50 kg. Cargill will also, on a case by case basis, offer specialty blends targeting farms that have specific need for additional nutrients of sulphur and magnesium. Micro nutrients such as boron, zinc and manganese will also be supplied. Discarded bags or garbage is expected to be small, and will be insignificant at the village land fill.

Cargill will import a truck spreader and a smaller fertilizer spreader that can be leased to the small farms.

Cargill will supply approximately 5-8 blended N-P-K fertilizers best suited for the soils, crops and yield potential of the area. They will have specific blends for wheat, corn, sugar beets, vegetables and sunflowers. In addition fertilizer blends will be produced that are suitable for Cargill?s technological package, such as starter fertilizer for new corn and sunflower varieties.

Cargill purchased a Doyle six-ton per batch vertical fertilizer blender, a bagging machine, two portable conveyers and a front end loader and placed them in the warehouse. To date, about 2000 tons of fertilizers have been blended and sold to 43 farms. Shipment of fertilizer (urea, monoammonium phosphate and potassium magnesium sulfate and potassium chloride) have been delivered to the warehouse in bulk by rail. After dumping on the cement floors from the rail cars, the individual materials are scooped from the floor and transported to the blender, where the desired quantity is dumped into the blender. The quantity of each material is calculated, based on

the desired ratio of nutrients in the blend and the nutrient concentration contained in each fertilizer material. The blending machine has a self-contained scale for weighing quantities of products added to the blender. Doyle Company has a very good reputation for manufacturing high quality equipment in the US.

Approximately $50,000 is needed to repair the doors and roof. Another $10,000 is planned to be invested to improve the locker rooms and showers for the plant employees. A small building on the site is planned to be converted into the soils testing laboratory, and a space on the property will be used to construct new offices.

Work will include:

1. Replacing the warehouse roof. The roof is made of corrugated asbestos. The planned replacement of the leaky asbestos roof suggested by Cargill must be done in a way that protects the roofing workers and Cargill employees from asbestos air pollutants. Roofing workers need to wear appropriate filter-masks. Cargill must advise the contracting company in writing that work be done safely with the old asbestos corrugated roofing, and that the contracting company safely dispose of the old materials in accordance with Ukrainian statutes. The warehouse floor needs to be sufficiently cleaned after roof replacement. The roof will not be re-roofed with asbestos.

2. Installing new electrical wiring and switching. Cargill is using top of the line Belgium electrical systems in upgrading the warehouse.
3. Placing barriers (walls) within the warehouse to provide stalls for individual products and prevent undesired mixing of fertilizers.

4) Installing showers and lockers for employees in the adjacent building (photo). The sewerage facilities presumably go to the municipal systems.

5. Construction of an office. Correct septic system or hook ups to the municipal system are required.

6. Run off collection system. Presently there is an adequate space to collect runoff, and there is an impermeable base of cement to prevent the contamination of the underground water supply. A test hole revealed that at a depth of 35 meters, no water had been encountered near the drainage. Another drainage ditch parallel to the collection pond is also collecting water. This ditch should be blocked at its entrance and inflowing drain waters from the patio should be diverted to the collection pond.

7. Quality of inputs. The monoammonium phosphate and urea fertilizers were of good quality and particle sizes were suitable to prepare good quality blends. However, the first shipment of potassium magnesium sulfate received had particle sizes ranging from dust to angular shaped particles measuring up to 8-10 mm in one direction. That product is unsuitable for blending, particularly with the two other products. A very carefully run operation may result in acceptable blends exiting the blender, but during handling, the large and small particles will segregate and result in variable nutrient concentrations spatially within the fertilizer mass. Better quality potassium fertilizer must be found in the future. The product on hand came from western Ukraine. Better sources of potassium fertilizer should be available from Russia and Belarus. Cargill sourced good quality potassium chloride from Belarus for subsequent supplies of potassium

fertilizer.

8. Painting the exterior of the warehouse. The exterior may be painted in the future.

(4) ALTERNATIVES INCLUDING THE PROPOSED ACTION

Due to Administrative synchronicity problems in the USAID Project development for the Ukraine, the Environmental Assessment Process for the Cargill Fertilizer blending operation cannot create or argue for certain kinds of Alternatives generally addressed in the normal Environmental Assessment process. The site was already selected by Cargill before the new CNFA environmental officer began work in Kiev. Suitable warehouses are rare or unavailable. Since the size of the project was already established by Cargill in terms of purchase, imported and assembled machinery and equipment, this EA will not present arguments contrary to those established facts. Cargill decided siting and size of the project before the environmental assessment process by CNFA began. It is the policy of the Agribusiness Partnerships II project to provide financial assistance to US-based businesses and their Ukrainian partners in the establishment of private enterprises in the Ukraine and other WIS countries. Because several proposals received within AP-II, such as this one by Cargill are continuing activities of those businesses, the overall concept of Environmental Assessment is somewhat altered. In this case, a request by Cargill for USAID participation and financing came after the fact of decisions on where, when and how to construct its fertilizer blending operations at this warehouse in the Donetsk Oblast. The EA process, therefore, must catch up with the rest of project planning and still serve to mitigate or avoid completely negative environmental impacts and promote those activities leading to positive environmental results. In terms of construction of the office buildings and renovation of the soil testing laboratory and employee?s cafeteria, locker room and showers, periodic review of the planning and construction is warranted. Sewerage connections to the municipal sewer system must be adequate, or construction of on-site satisfactory septic systems is necessary.

Due to this situation, the level of environmental examination in this EA is limited to the chosen site and the industrial parameters of quantified products described by Cargill. It becomes a mute point to describe an alternative of ?No Action,? since the action is already started. ?Alternatives? here are limited to bulk fertilizer management, water runoff from the property, noise, dust, emergency plan tool, handling of wastes from the soil laboratory outreach extension responsibilities of Cargill about advising customers on fertilizer transport, storage, use and disposal of containers.

4.1 Status of Environmental Assessment Process

The Project received a Positive Determination with some Categorical Exclusions in an Initial Environmental evaluation approved by USAID dated 3-4-97 (Attached as Appendix). A Scope of Work (also attached as an appendix) was written by Mark Mitchell of CNFA dated 3 February, 1997. This was submitted to USAID, but no documentation exists as to authorization from AID. The Authors of this present Environmental Assessment assumed that the tenants of the Scope of Work were valid. After 2 trips to the site in the Donetsk Oblast, several farms in the region and many interviews with Cargill staff, the EA was completed.

(5) AFFECTED ENVIRONMENT

5.1. Description of the Environment

The Donetsk Oblast is located in the Eastern Ukraine and is the most heavily populated part of the country. Major resources of coal, iron ore, and petroleum exist in the Oblast. The plethora of heavy industry such as coal mining, coal fired power plants, iron smelters and foundries, chemical factories, oil refineries, metal smelters, heavy appliance and aircraft factories etc. make Donetsk the combined Pittsburgh and Gary of the Ukraine. The area was infamous for its heavy acidic precipitation covering most of the eastern region in Soviet times. The current economic turmoil and inactivity in Ukraine is reducing air and other kinds of pollution. Many plants and industries lie idle or at very reduced production capacity, including agricultural production. Unemployment is very high, perhaps more than 50%. The Chernobyl atomic power plant meltdown of April 1986 and perhaps other nuclear facility leakages caused radiation contamination of the Donetsk Oblast, (refer to map) with at present, unknown agricultural consequences.

Since the dissolution of the Soviet Union in 1991, fertilizer use has plummeted in the Donetsk Oblast and the Ukraine in general (Graphs 1 & 2). Total tonnage for active ingredients of nitrogen, phosphorus and potassium fertilizer use in the Ukraine went from 3,804,300 metric tons in 1991 to 419,800 metric tons in 1996 (Source: Ukraine Agricultural Ministry - Foreign Relations). In Donetsk Oblast, use fell from 141,600 tons to 13,000 metric tons. This represents a potential agricultural production disaster of immense degree, and forebodings of imminent collapse of the economy.

Short- and long term implications to a sustainable society and environment are apparent with such a paucity of fertilizers in agriculture. The discontinued use of mineral nitrogen fertilizers depletes nitrogen from the soil, and causes imbalances in NPK ratios causing a condition of too much phosphorus and potassium. Mineral malnutrition drastically affects plant metabolism on a grand scale. Soil structure can change rapidly, creating a farming situation that will be progressively more difficult to correct as long as nitrogen extraction continues in the steppe wheat lands, sunflower fields and sugar beet areas. Reduced yields have the strong potential to cause famine which has repeatedly occurred in the Ukraine.

5.1.1 PHYSICAL ENVIRONMENT

The region is topographically broken with huge mounds of coal and limestone mine tailings that break the relief with cone-shaped mini mountains appearing similar to volcanoes and mesas.

Agriculturally, the Donetsk Oblast has the potential to be wealthy. Extensive planting of wheat, sugar beets, corn, sunflowers and soybeans cover vast acreages. The soils tend to be black chernozems, or of lighter grey yellow parent materials. Agricultural lands in Donetsk are concentrated in Priazovsko-Prychernomorskiy and Donetsk on high steppes or plains. Center pivot irrigation is present in some Rayons.

Geographical relief in the Oblast is flat, from sea level at the Sea of Azov, through low rolling hills and gentle valleys to the highest hill at 367 meters above sea level in the Donetsk hills (Iryaghe) and the lower Azov Hills. For the most part, the land is devoted purely to agriculture, primarily wheat and sunflowers, but is punctuated by occasional plantations of hardwoods used for green open space, fire wood and some lumber and recreation. Natural landscapes are classified as

agricultural lands, flood plains, deciduous forests, meadow-marshlands, various pools, ponds, small lakes, higher elevation forests, steppe landscapes with ?ordinary? chernozems of black earth, slopes and gullies. Around the villages are extensive individual gardens, where a large variety of vegetables and fruits are cultivated. Recent processes of privatization have created a sink for animal manures where the available fertilizers go to the privately owned garden plots at the expense of the larger collective and former collective farms. Thus, organic fertilizers are not reaching the macroeconomic production element of the large farms.

Important waterways are the Kalmius River which flows through Donetsk, to empty into the Sea of Azmov, and the Silver Donets River, which flows east to Russia. Climate is temperate, ranging from about 47-49 degrees latitude and about 36 degrees longitude east. The winter is medium in length with mean winter temperatures between 4 and 6 degrees Centigrade, with lows of -34. High temperatures can reach 40 degrees Centigrade. Precipitation ranges between 350 ml and 675 ml. annually. Soil types are relatively uniform, being almost all chernozem types.

5.1.2 BIOLOGICAL ENVIRONMENT

The native vegetation has almost been completely replaced by agriculture. The native fauna has been almost eradicated by habitat removal and hunting except for domestic species and some common vertebrates. Of particular interest botanically in Donetsk are those plant communities growing on rocky outcroppings and vegetation of limestone exfoliations. A complex of wild flowers, forbs, herbs and grasses exists in many of these locations. A profusion of remnant species exist from the past glacial age. There are some remnants of the Southern European deciduous forests, and ravines and gullies may be full of oaks. Habitat fragmentation and destruction by agriculture has caused a large number of rare and endangered species to be present in the Donetsk area (see Appendix).

In terms of fauna, in cities and their immediate surroundings, the following species are common; wild cats and dogs, turtle doves, black rats, white storks, blue-grey colored doves, pigeons, Syrian woodpecker, house martin, little house owl, black thrush, blackbirds, chaffinch (Athene noctua) and others. Around weirs, dams, and mill ponds are musk rats, beavers, otter, European and American mink, white tailed eagles, chicken hawks (hen harrier) and marsh harrier, plus different species of hawks. Several kinds of herons, (big, small, white, red and others) gray geese, fox, water hens (coots?), stint magpie, sand pipers, small striped woodpeckers, titmouse, whiskered calidris, marsh turtles, green lizards, multicolored lizards, water-snake, ordinary adder (viper), steppe viper, two kinds of tritons, grass toads and others.

In ravines and the forests of the steppe are spotted deer, foxes, hawks, pheasants, big eared owl, small striped woodpecker, magpie, rook, green lizard, grass-snake. On agricultural lands dwell field mice, grey hamsters, steppe cranes, larks, and partridge.

(6) LAND AND WATER ISSUES RELATED TO THE USE OF FERTILIZERS AND LABORATORY

With the breakup of the former Soviet Union, the flow of agricultural inputs including fuels, fertilizers and crop protection chemicals has been severely disrupted. Many of the collective and

newly privatized farms are unable to procure agricultural chemicals. Currently there is a privatization process occurring on many former state collective farms, although many collectives still exist. On numerous collective farms, a partial privatization occurred. One common formula was to keep one third of the farm as a collective, provide one-third for immediate privatization, and to retain another third as land owned by the dwellers of the villages under the sphere of influence of the collective farm. Thus, the previous collective farmers own an non spatially defined share of the former collective, which remains as a coherent economic unit. However, lack of credit for input and the almost complete stoppage in flow of capital is causing major consternation in getting the crops in during 1997.

According to the World Bank (1994), fertilizer applications declined between 1989 and 1992 by about 50%. The Ministry of Agriculture data base indicates that the drop in fertilizer use from 1988 to 1996 was about 92%. In 1988, total tonnage of N, P2O5 and K2O approached five million tons (personal communication with Ivan Yatsuk), and in 1996, only a total of 419.8 thousand tons were used on Ukrainian farmlands (See graphs). In the direct sphere of influence of the Cargill facility, fertilizer distribution has dropped form a total of 141.6 thousand tons in 1991 to 18.2 thousand tons of N, P2O5, and K2O in 1996. Only 400 tons of potassium fertilizer (K20) was used in the Donetsk Oblast in 1996.

Ukrainian official estimates of the optimum application of N, P2O5 and K20 is 180 kg per hectare average. The World Bank points out that this amount of fertilizer is for optimal predetermined production goals and not necessarily for monetary profits. The World Bank did not describe what ratio of NPK mineral fertilizers are recommended in the 180 kg/ha application rate.

Production of nitrogen fertilizer in Ukraine used to be sufficient to meet domestic demand, but all phosphorous and most potassium fertilizers are imported. However, according to the Ukrainian Ministry of Agriculture, now there is a major deficiency in fertilizer use. This may be due to the exportation of fertilizers from Ukraine to capture much needed hard currency linked with the lack of credit of farmers to purchase them for local use. It is obvious during the 1997 growing season that the vast majority of wheat, sunflowers, corn, sugar beets, and forages in the Kiev and Poltava Oblasts are nitrogen deficient (personal observations of WTW).

Correct fertilizer balances are critical for productive agriculture. For example, the discontinuation of adequate nitrogen fertilizer additions to the soil as has happened in Ukraine since 1991, creates soil structural changes which may be permanently deleterious to soil fertility and production potentials. Relying on the commonly used 7 year rotation scheme that does not include legumes results in mineral mining of the soil. One common rotation practice over most of the Ukraine is; fallow/hard winter wheat/corn/barley/fodder corn/hard winter wheat/sunflower. The lack of a nitrogen-fixing legume such as alfalfa (lucerne), clovers or soybeans results in a significant depletion of nitrogen from the soil. Even one fallow period cannot make up for the depletion. When the rotation includes fallow and conversion to weeds, their root systems extract nutrients from various depths and different soil partitions. The roots then translocate the nutrients into the foliage and floral parts. Upon completion of the annual life cycle, many minerals have been recycled to the surface and soil fertility is at least partially renewed. Then, with a light tilling, or minimal tillage practices, the organic matter from the previous year fallow plants gets converted into the top layer humus of the soil where next year?s crops can benefit from additional mineral nutrition. The organic material also produces organic acids which help decompose parent rock materials releasing more nutrients. Without frequent fallow periods in the absence of addition of

mineral or organic fertilizers, soils can become depleted of nutrients, even with the inclusion of legumes and other nitrogen fixing crops in the rotation scheme. In alfalfa, for example, the leaf and stem tissue is harvested and removed with its mineral content, even though its deep root system brings up minerals from the lower soil horizons to the top layer. But since nitrogen fixation occurs in root nodules and since the roots remain in the soil, much of the nitrogen remains in the soil even though the foliage is harvested.

USAID suggested that the Enviornmental Assessment addredd the issue of excessive fertilization and pathways of possible fertilizer contaminants. Excessive fertilization is not considered to presently be a problem in the Ukraine. When excessive fertilization does occur, especially with nitrogen in the form of volatile ammonium compounds, both economic and environmental resources are wasted. Overuse of fertilizers burns crops. Extra nitrogen sublimes or washes out of the soil to waterways. There is also a certain amount of volatilization using ammonium fertilizers. Near urban areas, ammonium ions can be partially responsible for ozone formation in the atmosphere, as well as creating acid precipitation. The ammonium ions from the fertilizers react with urban pollutants to form acids which lower the pH of precipitation. Run off of fertilizers from fields in heavy rainfalls contaminates wells and waterways. These pollution pathways have resulted in regional wide poisoning of water supplies with nitrates and nitrites in many parts of the world. Nitrogen and other fertilizers escaping from farmlands cause algal blooms which suffocate aquatic life forms, odor problems and create habitats for disease vectors, especially water borne diseases in the tropics. A 1997 fish kill in a reservoir in the Cherkasky Oblast was blamed on excessive nitrogen fertilization where runoff after a storm created nitrogen pollution to the point where the water became toxic. Nitrogen pollution was not verified as being the culprit, however in this case.

Correct replacement of plant-extracted nutrients results in sustainable agriculture soil mass equations which must include mineral losses through erosion, evaporation and soil solution gravitation effects. Without replacement, soils become exhausted of their mineral resource, and agriculture fails. For example, in rape seed production, yields of 4032 kg/ha remove about 134 kg/ha of nitrogen, 56kg/ha of phosphorus (P2O5), and more than 67 kg/ha of potassium (K2O) each year (Chapman and Carter, 1976). Fertilizer recommendations to maintain proper nutrient ratios depend on the results of soil tests. Application of nitrogen fertilizer is recommended for soils with less than 95 kg/ha. Potassium may be required on sandy soils at rates of 34-67 kg/ha. Sulfur may also be required (Chapman and Carter, 1976).

6.1 VARIOUS RECOMMENDATIONS FOR OPTIMUM CROP YIELDS.

Montana. Depending on macronutrient blends, spring wheat in Montana varied greatly in response to different amounts and combinations of fertilizers. Control plots yielded 29 bushels per acre = about 1300 kg/ha and optimal production with fertilizers was 57 bu/ac = about 2590 kg/ha. (Chapman and Carter, 1976)

Ukraine. E.G. Degoduk and O. T. Predko in the Ukraine (Saiko, 1994) calculated the effects of fertilization on cereals, corn, groat and pulse crops in three regions under three climatic regimes. The results of applications of 1 kilogram per hectare of active substance of mineral fertilizers were that in winter wheat as an example, an increase of from 3.2-4.7 kilograms yield occured. On the average ?1kg of full mineral fertilizer provides increase of yield by 4.5 kg?. Recommended fertilization rates were not mentioned in the article. With winter wheat during good years average

yields ranged from 500-600 kg/ha and during bad years yields fluctuated from between 3-4 tons per hectare. Corn ranged from 6-7 t/ha in good years and 4-5 t/ha during bad years. Above all else, the fertilizers appeared to stabilize yields in different climates, with about a 25% increase in yield using fertilizers in the bad years.

Monsanto experience in Donetsk Oblast with optional fertilization for winter wheat between 1990 and 1996 ranged from 4.01-5.59 t/ha.

The Ukrainian Main Statistics Department reported the 1996 yield of grain in Ukraine for all Oblasts ranged between 1.47 and 3.12 tons/ha. These yields were from 0.5 and 10.6 percent lower than 1995 yields due to the ?severe weather conditions.?

Cargill?s research from various sources demonstrates the net benefits of using balanced fertilization supplied by carefully chosen blends

Crop	Avg. % yield increase	Avg Net benefits dollars per hectare
Corn	29%	$37
Wheat	32%	$23
Rice	15%	$20
Tomato	26%	$60

Cargill determined fertilizer requirements from soil samples near Donetsk on a field that just came out of winter wheat production. The results showed that in order to produce 2.8 tons/ha of sunflowers this farm should apply 114-62-22 kg/ha of N-P2O5-K2O respectively. Cargill anticipated the average yields in Ukraine in 1997 will be at 1.8 tons/ha using 40-20-0 kg/ha. Using sunflower market prices to $190 FOB and per kg\ha costs of N-P2O5-K2O respectively at $0.43-0.58-0.22 would give increased revenues of $152/ha while increasing the fertilizer cost by $61 for a net increase in profits of $91 per hectare.

The USDA reported that application rates in the Ukraine during 1986-1990 averaged 64.9-42.0-41.9 kg\ha of N-P-K. By 1994 that average was reduced by 8.-4.7-3.3 Kg/ha of N-P-K or a decrease of 89%.

Therefore, correct replacement rates of specific blends of fertilizers as proposed by Cargill are critical for maximal production and sustainable agriculture. Modern machinery ensures that the right amount of fertilizers are applied at the right depths for plant absorption and minimization of fertilizer losses through sublimation and runoff and leaching through downward movement. Correct application of fertilizers also implies contour planting, and leaving open swaths between fields and waterways.

(7) LAND AND WATER ISSUES RELATED TO THE STORAGE OF FERTILIZERS

Improper fertilizer management and storage can result in environmental contamination and worker accidents. Ground water contamination in particular is a problem should excessive spills of fertilizers occur which are not correctly cleaned up. As a part of the evaluation of the Cargill facility, the Expert System for ?Fertilizer Storage and Handling Practices Risk Assessment? from

Purdue University was completed. Although the expert system is designed for farm situations, a part of the survey applies to the blending plant. The results of this assessment were that the facility is inherently of concern because of the presence of so much chemical. However, the condition of the warehouse, management behavior, location of water sources, and type of security all lowered the environmental risk to ?low to moderate risk? category. The warehouse situation provides reasonable groundwater protection.

(8) IMPACT OF THE BLENDING PLANT ON WATER AND POWER SUPPLIED AND WASTE DISPOSAL.

Although at certain times, Ukrainian electrical services are sporadic, industrial users have top priority. It is not envisioned that the Cargill blending facility will experience electrical difficulties. Their electrical system has been rebuilt, and electrical use is not extensive at the plant, serving only lights, conveyer belts and electrical motors for the blending operation. Sufficient fuel should be available for the skip loader and trucks. Waste disposal of torn or discarded bags will be through the municipal waste system which appears to be adequate in most places in the country. These kinds of wastes should be minimal.

(9) AIR EMISSIONS AND NOISE LEVELS.

9.1 Air emissions will occur from combustion products from truck and automobile traffic in and out of the plant, skip loader activity within the warehouse and around the property, and additional train hauling of the bulk fertilizers. Some dust will be created during loading and unloading operations in the warehouse by fertilizers. Dust will be minimal in the patio area since it is made of cement. The arterial highway going past the highway is all weather surfaced. The plant is located in a rural area in a light industrial zone adjacent to a railroad. Air circulation is sufficient to completely and rapidly disperse air pollutants. A problem is not foreseeable from air pollution.

9.2 Noise will arise from the activities mentioned in 9.1, and from the operation of the blending equipment and conveyer belts. These activities are not considered to be excessively noisy. The noisiest activities except for train traffic will occur within the warehouse, where decibels will be abated by the warehouse walls protecting the outer environment. It is doubtful if earplugs would be necessary during blending and bagging activities.

(10) POTENTIAL IMPACTS OF TRANSPORTATION

The all weather hard surfaced road leading to the warehouse from the freeway is not heavily traveled. The cement patio surrounding the warehouse is in good condition. No negative impacts to transportation are foreseen with this project, especially because of its rural setting on the outskirts of the village.

(11) EFFECTS OF FACILITY DEVELOPMENT ON AESTHETICS AND VISUAL QUALITY.

The warehouse is not visible from the village and is of satisfactory aesthetic standards.

There is a grove of deciduous hard woods such as oaks, basswood and black locust planted along the road. The trees will not be removed and they make facility separate from the surrounding area. The location of the warehouse was chosen correctly and is located in a light industry zone.

(12) ABILITY OF THE LOCAL COMMUNITY OR GOVERNMENT TO PROVIDE EMERGENCY RESPONSE SERVICES AND AVAILABILITY OF MEDICAL FACILITIES.

Krasnogorivka village is located 5 km from the Cargill Fertilizer facilities and there is emergency service in the village hospital. Cargill also has an emergency response workers plan.

(13) ENVIRONMENTAL CONSEQUENCES

In a fertilizer-starved environment, additional correct applications of the kinds of fertilizers that Cargill will be distributing will have an overall positive effect on the environment. Increased yields will provide much needed capital for the country. Farmers will then have options for better land husbandry, and investments in conservation practices, such as minimum till agriculture. Increased crop yields due to fertilizers will help pay balance of payments, increase capital and the standard of living for the entire country. Cargill**?**s technical package of soil testing, specific blending for individual soils, and custom applications with the latest equipment will assure that the proper amounts of fertilizers are cast at the right time in the right places.

(14) LIST OF PREPARERS

The CNFA Former Environmental Advisor, Mark Mitchell, and Ken Lyvers, USAID/Kiev, prepared the Initial Environmental Evaluation (Appendix). The IEE was approved on 3-4-97 by the Director of USAID/Kiev and the ENI Environmental Coordinator. The Scope of Work for the Environmental Assessment, was drafted by Mark Mitchell on 3 February, 1997. Dr. Wayne Williams and Lena Lopantseva completed the Environmental Assessment. Dr. Williams is currently the Environmental Officer for Citizens Network for Foreign Affairs projects in Kiev, Ukraine. He has extensive experience in the Environmental Assessment field, successfully completing several dozen Environmental Assessments for USAID in Central America from 1991 through 1995 in his capacity as Regional Environmental Advisor for USAID/ROCAP in Guatemala. These and other Environmental Assessments completed by Dr. Williams covered the widest possible range of topics including medical clinics construction, solid and liquid waste disposal, public health and other projects including large and medium sized industrial operations, including electrical power generating plants. Dr. Williams has designed, built and supervised several technical laboratories. He has conducted extensive agricultural research on plant nutrition with macro and micro nutrients. Lena Lopantseva, Environmental Assistant for Citizens Network for Foreign Affairs projects in Kiev, Ukraine. Masters Degree in Physics. Minor in Science Education.

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(16) APPENDIX

A. Initial Environmental Evaluation
B. Scope of Work for Environmental Assessment
C. Maps of Region
D. List of Rare and Endangered Species in Donetsk Oblast and Surroundings.
E. Results of Risk Assessment Survey
F. Fertilizer Statistics for Ukraine, 1991-1996
G. Photographs of Facility